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10/575,463	04/12/2006	Takashi Izumi	L928906139	3207

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EXAMINER	
RADONIC, NICOLA	
ART UNIT	PAPER NUMBER
4192	
MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/575,463	IZUMI ET AL.	
	Examiner	Art Unit	
	Nicola (Nick) Radonic	4192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/12/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

[1] The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: LOCAL OSCILLATOR block and signal labels. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

[2] Figures 3, 4, 6, 7, 8, 9,10, 11, 12, and 16 have multiple blocks labeled "LOCAL OSCILLATOR", where the blocks are not differentiated on the drawings, and some of their outputs signals are not labeled, especially for block 116. Amended drawing labels will need to be referenced in the specification.

[3] Figures 3, 4, 6, 7, 8, 9,10, 11, 12, 14, and 16 have signals coming out of mixers tied together on the drawings with nonfunctional dots. This is not physically realizable without specifying the nature of the connections. It is not clear if this is an electrical summation function, or an implied addition through direct electrical connection, thus requiring knowledge of the interaction of the output circuits when wired together.

[4] Reference in claims 1,2,3,4,5 and 6 and the specifications is made to signals that are not identified on the drawings: "first local signal", "first constant-envelope signal", "second local signal", "second constant envelope signal", and "local signals".

Specification

[5] The disclosure is objected to because of the following informalities: Fig. 3, Blocks 18a+b are not described in the specification.

Appropriate correction is required.

Claim Rejections under 35 USC § 103

[6] The following is a quote from 35 U.S.C 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

[7] Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admission of prior art (AAPA) in view of Okubo (US 5,264,807, Nov. 23, 1993).

[8] As per claim 1, AAPA teaches: An amplifier circuit (Fig. 3: 10a) comprising: a generating section that generates a first local signal (Fig 3: outputs of 16a+b) and a second local signal (Fig 3: outputs of 16c+d) which are used in frequency conversion of a first constant-envelope signal (Fig 3: outputs of 19a+b) and a second constant-envelope signal (Fig 3: outputs of 19c+d) having respective predetermined phases, the first local signal and the second local signal having a 180° phase difference there between; (not taught in AAPA but obvious as explained below) a frequency conversion section that performs frequency-conversion of the first constant-envelope signal (Fig 3: 21a) and the second constant-envelope signal (Fig 3: 21b) using the generated first local signal and second local signal; an amplifying section that amplifies the frequency-converted first constant-envelope signal (Fig. 3: 12) and second constant-envelope signal (Fig. 3: 13); and a combining section that combines the amplified first constant-envelope signal and second constant-envelope signal (Fig. 3:15).

[9] AAPA does not teach: "having respective predetermined phases, the first local signal and the second local signal having a 180° phase difference there between". Okubo does teach "having respective predetermined phases, the first local signal and the second local signal having a 180° phase difference there between" (Okubo, Page 12, Column 10, Lines 21-24).

[10] Okubo uses a single phase shift block to achieve the 180° phase shift, versus 2 blocks in Fig. 4. The phase shift block is a generic component found in both AAPA and Okubo, and the phase shift can be designed to have any value. It would therefore have been obvious to someone of ordinary level of skill in the art of amplifier design at the time of the invention to combine additional phase shift blocks with the AAPA to produce the phase shift in the claim. The rationale for this combination is that phase shift can be treated mathematically, and lumped in one location in a circuit or distributed in multiple locations to achieve the same result.

[11] As per claim 2, AAPA in view of Okubo teaches: "The amplifier circuit according to claim 1, further comprising a local signal phase adjustment section that adjusts a phase of at least one of the generated first local signal and second local signal". AAPA phase shift blocks (Fig. 3: 18a+b) adjust the phase of the first local oscillator signal.

[12] Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Okubo as applied to claim 2 above, and further in view of Moriyama (US 5,903,823, May 11, 1999).

[13] As per claim 3, AAPA in view of Okubo teaches: "The amplifier circuit according to claim 2,". AAPA in view of Okubo does not teach "further comprising: a detecting section that detects a level of leakage of the local signals in an output signal ", but this is obvious in view of Moriyama as explained below. AAPA in view of Okubo teaches: "obtained as a result of combining by the combining section;" (Fig. 3: 14). AAPA and Okubo do not teach: "and a phase control section that controls the local signal phase adjustment section in such a manner that the detected level is minimized", but this is obvious in view of Moriyama as explained below.

[14] Moriyama teaches the equivalent of: "further comprising: a detecting section that detects a level of leakage of the local signals in an output signal" (see Moriyama, Page 75, column 9, line 18 – column 10, line 12).

[15] Moriyama teaches the equivalent of "and a phase control section that controls the local signal phase adjustment section in such a manner that the detected level is minimized" (see Moriyama, Page 75, column 10, line 58 – column 10, line 68).

[16] It would have been obvious to one of ordinary level of skill in the art of amplifier design at the time of the invention to combine the signal feedback, measurement and phase control described in Moriyama with the amplifier described in the AAPA in view of Okubo. The rational for the combination is given explicitly in the Moriyama abstract as: "Leakage of carrier produced due offset of the orthogonal modulator is detected and the arithmetic/control unit adjusts the level of the modulating signals or shifts the phase of the reference carrier wave in such a manner that the leakage of carrier (offset) becomes zero".

[17] Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the AAPA in view of Okubo as applied to claim 1 above and further in view of the Mini-Circuits related application notes: "How To Select A Mixer" application note (mixer1-5a.pdf dated 09/08/1999), "Understanding Mixers" (mixer1-2.pdf), and "Modern Mixer Terms Defined" (mixer1-4.pdf) non patent literature (NPL).

[18] As per claim 4, AAPA in view of Okubo teaches: "The amplifier circuit according to claim 1,". The AAPA in view of Okubo does not teach "further comprising a local signal amplitude adjustment section that adjusts an amplitude of at least one of the generated first local signal and second local signal". However this is obvious as described below in the Mini-Circuits NPL.

[19] The Mini-Circuits application note (mixer1-5.pdf) describes the use of mixers in RF frequency conversion, and discusses the design trade offs between signal level and local oscillator (LO) signal level and the resultant carrier leakage (pp. 1-10). In the application the equivalent of "local signal amplitude adjustment section" is to put an attenuator between the output of the Local Oscillators (Fig. 3: 20, 22) and the input to the mixer stages (Fig. 3: 19a,b,c and d and 21a and b). This would have been obvious for someone with an ordinary level of skill in amplifier design at the time of the invention since the use of attenuators is commonly required to adjust signal levels in RF circuitry.

[20] The Mini-Circuits mixer1-5.pdf application note gives the rational for controlling the local oscillator (LO) signal amplitude as "Decide what frequency range is involved, the LO drive available, the level of harmonic and two-tone, third-order intermodulation (IM) distortion you can tolerate".

[21] Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the AAPA in view of Okubo further in view of Mini-Circuits NPL applied to claim 4 above, and further in view of Daniel (US 4,243,955, Jan. 6, 1981).

[22] AAPA in view of Okubo and Mini-Circuits NPL teaches: The amplifier circuit according to claim 4". AAPA in view of Okubo and further in view of Mini-Circuits NPL does not teach: "further comprising: a detecting section that detects a level of leakage of the local signals in an output signal in such a manner that the detected level is minimized." But this is obvious as described below.

[23] Daniel teaches the equivalent of "further comprising: a detecting section that detects a level of leakage of the local signals in an output signal in such a manner that the detected level is minimized." (Page 5, column 4, lines 21-29): "In this configuration, the inphase and quadrature correlations of the output signal of modulator 30 are derived and are used as control signals to weight the inphase and quadrature LO outputs before precombining in the first summing device 58 which, upon weighting with amplifier 60, is combined with the output signal of modulator 30 via the second summing device 56, thereby producing a final mixed signal with a substantially reduced carrier leakage term."

[24] Thus it would have been obvious to one of an ordinary level of skill in the art of amplifier design at the time of the invention to have combined the AAPA in view of Okubo and Mini-Circuit NPL, further in view of Daniel's feedback method to control LO feedthrough. The rational for this is given in Daniel (page 4, column 2, lines 8-10) as "The performance of systems using suppressed carrier modulation is often limited by how well carrier suppression is maintained".

[25] Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the AAPA, in view of Okubo, applied to claim 1 above, and further in view of Moriyama.

[26] As per claim 6, AAPA in view of Okubo teaches: "The amplifier circuit according to claim 1,". AAPA in view of Okubo does not teach "further comprising a constant-envelope signal phase adjustment section that adjusts a phase of at least one of the frequency-modulated first constant-envelope signal and second constant-envelope signal." But it would be obvious as described below in view of Moriyama.

[27] Moriyama does teach the equivalent of "further comprising a constant-envelope signal phase adjustment section that adjusts a phase of at least one of the frequency-modulated first constant-envelope signal and second constant-envelope signal." as Moriyama page 77, column 13, lines 52-60: "In FIG. 7B, the phase-difference measurement unit 24e of the phase-difference correcting arithmetic/control section 102 measures the phase difference d.theta. between the modulating signals and demodulated signals before pre-distortion processing is executed, and the phase-shift quantity controller 24i shifts the phase of the reference carrier wave to be added to the orthogonal modulator 28 (see FIG. 6) or orthogonal detector 34 in such a manner that the phase difference d.theta. becomes zero". It would have been obvious to one skilled in the art of amplifier design at the time of the invention to use the Moriyama phase adjustment to control the phase of one of the constant envelope signals to correct for measured carrier phase error.

[28] The rational for using this technique is to compensate for offsets in transmitter signal phase as specified in the Moriyama Background Of The Invention: "This invention relates to a radio apparatus equipped with a distortion compensating function. More particularly, the invention relates to a radio apparatus with a distortion compensating function in which the amplification characteristic of a transmission power amplifier is linearized to suppress non-linear distortion and reduce power leakage between adjacent channels."

Claims 7 and 8 are rejected under 35 USC 103(a) as being unpatentable over AAPA in view of Okubo applied to claim 1.

[29] AAPA in view of Okubo teaches claim 7: "A wireless base station apparatus comprising the amplifier circuit according to claim 1".

[30] AAPA in view of Okubo teaches claim 8: "A wireless terminal apparatus comprising the amplifier circuit according to claim 1".

[31] The Background Art section of the specification, describing AAPA (page 19, paragraph 2, lines 13-16), says: "One system referred to as the LINC (Linear Amplification with Nonlinear Components) system exists as a system for an amplifier circuit of the conventional art.".

[32] Since conventional art amplifiers of all sorts are used in any specific RF amplifier application, it would have been obvious to someone of ordinary skill in the art of amplifier design to use this form of amplifier in either end use. The rational for substituting one form of amplifier for another is that different amplifiers are interchangeable at the level of functionality and substitution produces predictable results.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICOLA RADONIC whose telephone number is (571) 270-5246. The examiner can normally be reached on IFP work schedule, with some Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pankaj Kumar can be reached on (571) 272-3011. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NR
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